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ABSTRACT

Videotaped group work lessons of an elementary school third grade class provide material for study of the non-verbal aspect of group behavior. A system of activity categories is developed and a typology of pupils' working methods in group study distinguishes types and characteristic forms of activity. The following activity categories are used in the case study: (1) Independent activity on own initiative, (2) Collaboration, (3) Helpful activity, (4) Attention to task, (5) Search for knowledge, (6) Passive activity, and (7) Disturbed activity. Five dimensions which reflect a working type are noted: Independent, Solidarity, Work-centered, Passive, and Disturbed. Results of the study are analyzed and presented in graphic form. It is found that the development of categories succeeded in terms of reliability and non-ambiguity, although validity was not established. (SHM)

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VII. Non-verbal Behaviour in Group Work
Observational Technique and Typology of Pupils' Work

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Marja Martikainen

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Institute of Education
University of Helsinki
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Preface

Seventh in the series "Investigations into the Instructional Process" appears the report of Mrs Marja Martikainen on observation of non-verbal behaviour in group work situations arising in the school class of our Institute, a class already familiar to readers of previous reports in this series.

Among systems of observational taxonomies developed for classroom interaction analysis, the vast majority and the best-known are based on the assumption that invariances of the instructional process can be revealed mainly through an analysis of verbal behaviour. It is obvious that serious difficulties must be encountered in the classification and interpretation of verbal behaviour during early school years, yet very little has been done to investigate the possibility of removing these obstructions by the use of non-verbal behaviour as a basis for classification. Here, in my opinion, lies the significance of the present report.

Matti Koskenniemi

Institute of Education
University of Helsinki
September 1972

Investigations into the Instructional Process

VII. Non-verbal Behaviour in Group Work
Observational Technique and Typology of Pupils' Work

1. Background and purpose

When group work behaviour is examined by observational methods based on the verbal interaction process, no account is taken of how other group members act when the verbal behaviour of one member is the subject of attention. The picture of group work and pupils' roles thus remains incomplete. It is of special importance to record all activities, including non-verbal, of the pupil in cases where the latter's verbal interaction is limited to a few responses only. Observation of verbal behaviour gives no picture of a pupil of this kind, although he may be one of the group's active members.

The purpose of this study was to evolve a system of activity categories which could be used when observing the non-verbal aspect of group work behaviour. The theoretical frame of reference is based on the general theory of Schaffensunterricht introduced by Elsa Köhler in 1932, and on the general characteristics of social interaction as stated by Parsons (1968) and Bales (1951). There are methodological similarities between the activity categories used and the interaction analysis of Bales. The two will be used together at a later stage for the purpose of obtaining as complete a picture of group working as possible. A further aim of this study was to determine whether a typology of pupils' working methods in group work situations can be composed by means of the activity categories evolved.

2. Scheme of study

2.1. Activity categories and pupils' working types

Methodologically, activity categories are based on the interaction process analysis of Bales (1951) and the CASES categories of Spaulding (1970). The categories took their final form from empirical pilot studies. The task of evolving pupils' working types was stimulated by Elsa Köhler's theory of Schaffensunterricht and her activity typology.

According to Bales, the activity unit observed is the smallest section of behaviour which can be regarded as significant for the group's other members. The essence of the method is that the activity of all group members is observed simultaneously, even if a change of activity occurs in one member only. In this way the dependence of members on each other can be eliminated and results are not affected by the dominating status of one member: each member receives an equal number of codings during the lesson. In situations where the behaviour of all members remains the same for some time, unitization shifts to a basis of time, with activity divided into three-second periods for each member. This combination of two unitizing methods is essential if uniform working periods of longer duration are to be brought to light.

The following activity categories of non-verbal behaviour have been evolved:

1. Independent activity on own initiative
   - planning
   - spontaneous reading, calculation, writing
   - creative activity

2. Collaboration
   - mutual giving and taking
   - looking at each other
   - working together

3. Helpful activity
   - any activity in which an individual offers help to another
   - response with show of feeling

4. Attention to task

   - attentive listening and watching
   - performance of task given by group members
   - concentration on theme dealt with
   - attention to procedure of teacher assisting group

5. Search for knowledge

   - action showing lack of knowledge required for solution of problem (e.g., putting up hand, looking at others' papers)

6. Passive activity

   - passively following work of group members

7. Disturbed activity

   - attention to occurrences outside group
   - eyes straying elsewhere
   - jumpiness, fumbling, fidgeting
   - teasing, disturbance.

Five dimensions are distinguished, each of which reflects a working type. Types and their characteristic forms of activity are:

I Independent working type corresponding to Köhler's creative type. Forms of activity characteristic of this type are found in category 1.

II Solidarity type, characterized by forms of behaviour found in categories 2 and 3.

III Work-centred type corresponding to Köhler's work type. Characteristic forms of activity found in categories 4 and 5.

IV Passive type, behaviour in accordance with category 6.

V Disturbed type, activities as in category 7.

2.2. Subjects and material

Material was videotaped from group work lessons of an elementary school third grade within the University of Helsinki Institute of Education during the school year 1969-1970.

Of the 16 group work lessons videotaped during the school year five were chosen for study, using the following criteria:

a) the four subject matter areas in which lessons had been tape-recorded were represented;
b) as many pupils as possible were included (16 out of 18);
c) attendance of some pupils in two different groups, enabling comparisons to be made with regard to stability of working habits (control pupils).

All five groups contained four members of the same sex.

Table 1. Subjects of lessons and composition of groups

Group	Subject		Length of lesson	Nature of task
I	Finnish	girls: KH, SLH, PJ, ST	33'30"	Grammar repetition
II	Divinity	boys: OS, JRJ, KJ, SEH	36'	Story of Joseph
III	Arithmetic	boys: KJ, AK, SEH, EL	39'45"	Verbal problems
IV	Divinity	girls: PM, VM, JKJ, AR	38'15"	Ten Commandments
V	Civics	girls: SLH, JKJ, CB, KK	31'45"	Ideal school

The first three were actual problem-solution groups whose members performed tasks on the basis of what they had learnt. In the last two groups the finding of solutions was based on pupils' opinions, and answers as a rule were neither right nor wrong.

2.3. Observation

Videotape was used always for observation of the activities of two pupils simultaneously. A check was made at ten-unit intervals (on the average) to ensure that the pairs observed were in fact working simultaneously. In addition to the performer, the target was recorded. Units were coded in the seven categories with the aid of videotape and data appearing on the coding form.

Unitizing reliability, which includes attributing reliability, was calculated by percentage index. A reliability of .78 was obtained for the whole material, the variation between groups being .03. The unitizing reliability of the method would exceed .80, however, if there were two simultaneous observers from videotape.

For categorizing reliability between two observers a figure of .88 was obtained by Scott's Π-coefficient. Reliability calculated by percentage index was .90, the figure varying by categories between .71 and 1.00. These figures may be considered to show sufficient objectivity in coding.

3. Results

3.1. Correlations between categories

The correlation matrix between categories (Table 2) expresses the interdependence of categories throughout group work lessons. The figures are so low that the categories may be considered sufficiently independent of each other to meet the requirement of independence imposed on the observational methods.

Table 2. Correlation matrix between categories

Cat.	1	2	3	4	5	6	7
1	1.00						
2	-0.28	1.00					
3	0.31	0.36	1.00				
4	-0.65	0.42	-0.25	1.00			
5	0.05	-0.31	-0.10	-0.14	1.00		
6	-0.51	-0.21	-0.21	0.18	0.02	1.00	
7	-0.48	0.43	0.15	0.21	-0.31	0.33	1.00

3.2. Factor analysis

The material was subjected to factorization by the principal axis method, and to rotation by the orthogonal varimax technique. Two, three and four factors were used with the varimax (Appendix 1), the solution reached with three factors being the most interpretable.

The following factors were arrived at by interpretation:

I	1. independent activity	-0.65
	4. attention to task	0.82

This was called the work concentration factor. It corresponds to the supposed work-centred type; in category 4, on the other hand, the influence of the fifth category does not appear.

II	2. collaboration	0.69
	3. helpful activity	0.49
	7. disturbed activity	0.56

Despite the high load of category 7 the second factor is called the solidarity factor. The inclusion of disturbed activity in it results from the nature of the lessons. During those lessons in which the most collaboration occurred, tasks

demanded the expression of opinions and were found difficult by pupils, who then became impatient, with a consequent increase of disturbed activity. The factor can be considered to reflect the supposed solidarity type.

III	1. independent activity	0.55
	6. passive activity	-0.73
	7. disturbed activity	-0.47

This is called the factor of independent working or asceticism. It corresponds to the supposed independent activity type.

Of the five supposed activity types the factors describe the first three. Type IV, the passive, emerges clearly in the third factor with a strong negative load. The disturbed type, on the contrary,—cannot be clearly interpreted, at least in the material in question.

Table 3. Pupils' scores with the three interpreted factors

		II	I	III
Group I	KH	493	442	592
	SLH	414	441	607
	PJ	478	448	526
	ST	524	294	562
Group II	OS	446	587	295
	JRJ	455	542	499
	KJ	400	443	645
	SEH	497	499	455
Group III	KJ	443	378	325
	AK	379	551	474
	SEH	306	497	635
	EL	391	560	551
Group IV	PM	575	766	527
	VM	554	597	540
	JKJ	611	475	369
	AR	693	559	561
Group V	SLH	534	578	462
	JKJ	677	450	534
	CB	556	393	351
	KK	573	501	489

In groups I, II and III, which were of an actual problem-solution character, the factor scores given in Table 3 show clearer results than in opinion groups. The behaviour of only one pupil seems to represent none of the types (SEH in group II). This pupil, however, was also present in group III, where his behaviour was clearly in accordance with the third factor.

3.3. Control pupils

The nature of a group work lesson and tasks, and the composition of a group have an effect on a pupil's behaviour which is made clear by comparison of the profiles of control pupils. Factor and percentage profiles of control pupils are found on pages 10-11, and Scott's Π figures between the four profiles in Table 4.

Table 4. Scott's Π figures between percentage profiles of control pupils

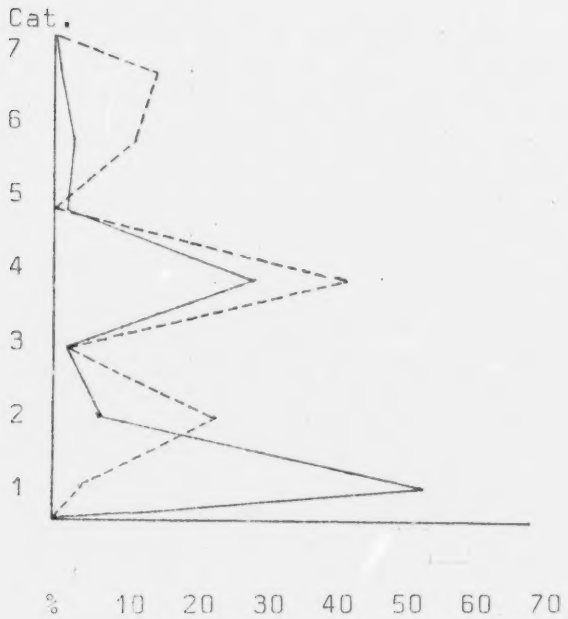
		SLH V	JKJ V	SEH III	KJ III
SLH	I	-.41			
JKJ	IV		+.08		
KJ	II			-.29	
SEH	II				-.33

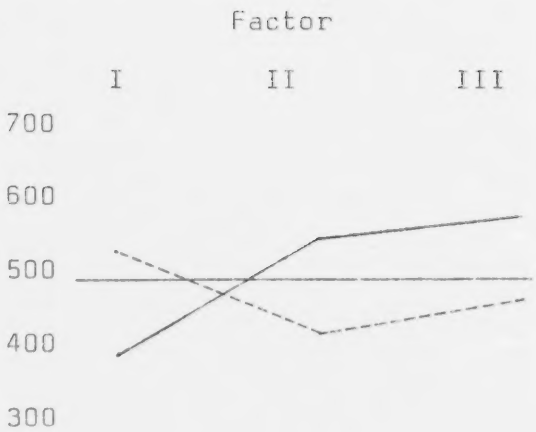
SLH was present in both the problem-solution and the opinion group. The discrepancies in her behaviour seem to arise from the differing nature of the groups and tasks.

JKJ was in two similar opinion groups, but her status differed from that of other members. In group IV the other members excluded her for most of the lesson, while in group V she acted as scribe. Discrepancies of her behaviour thus seem due to the differing composition of groups and member's roles. Differences of behaviour between KJ and SEH are mainly due to the tasks given them and the enjoyment thereof.

SLH profiles in group I ——

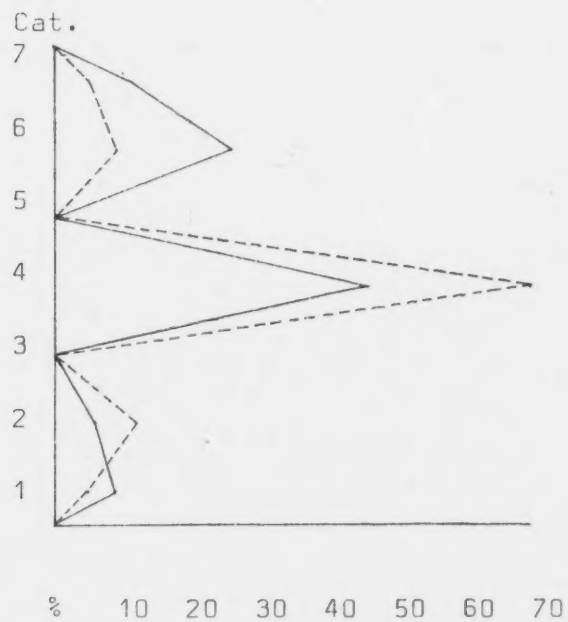
SLH profiles in group V - - - - -

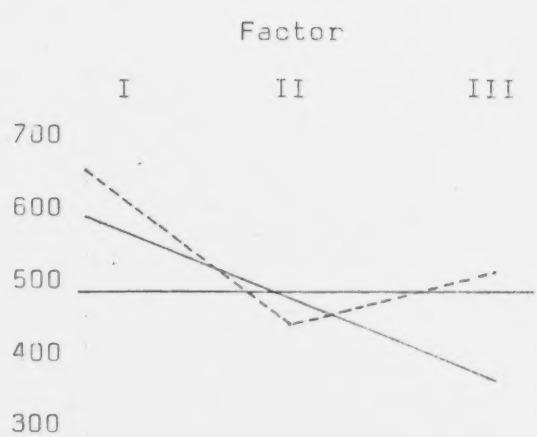




JKJ profiles in group IV ——

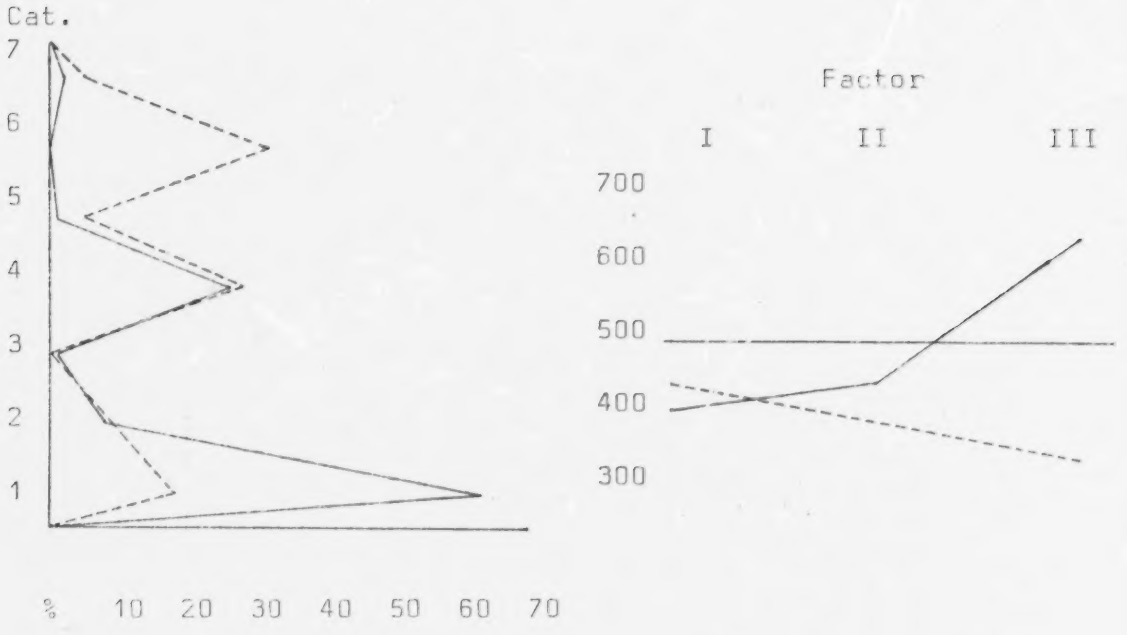
JKJ profiles in group V - - - - -





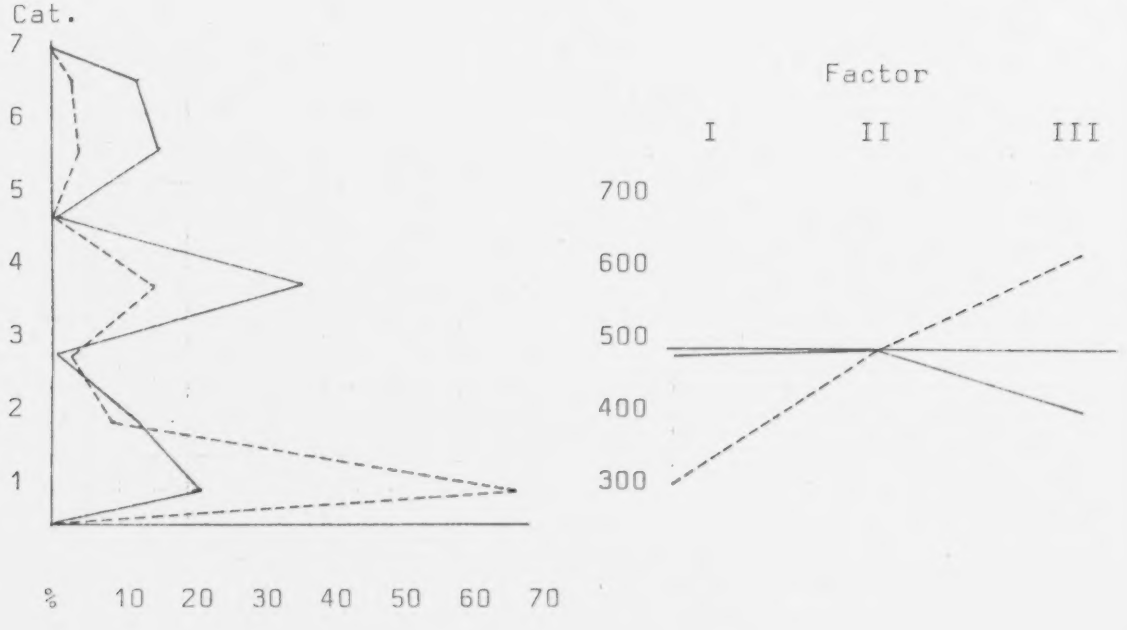
KJ profiles in group II ——

KJ profiles in group III - - - - -



SEH profiles in group II ——

SEH profiles in group III - - - - -



3.4. Examination of profiles

Percentage profiles of groups were compared by means of Scott's Π coefficient and by using the z-test to check differences in frequency of occurrence between categories.

When percentage profiles between groups (Appendix 2) and Π figures in Table 5 are examined, the similarity of problem-solution groups as such (groups I, II and III) and, correspondingly, of opinion groups (IV and V) is to be noted. On the other hand, profiles of opinion groups differ clearly from those of problem-solution groups, except for the fairly high figure between groups II and IV.

Table 5. Scott's Π coefficients between groups

Group	I	II	III	IV	V
I	1.00	.41	.50	.10	-.16
II		1.00	.53	.43	.19
III			1.00	.11	-.05
IV				1.00	.61
V					1.00

When the whole material was compared with each group by categories, it was noted that numerous statistically significant differences occurred in each category. On the basis of the figures conclusions were drawn as to the forms of aktivity characteristic of group working of various types. In actual problem-solution groups independent activity occurred more often in a statistically significant sense than in the material as a whole. Correspondingly, the share of collaboration was significantly smaller. In opinion groups the situation was quite the contrary.

3.5. Comparison of phases

Taking Bales' phase hypothesis as an example, lessons were divided into a first, middle and final phase, each of which included one third of the activities occurring in a group work lesson. The purpose was to examine whether the shift from one part of a lesson to another occurred with any regularity when activity categories were used. When Scott's Π figures between phases were calculated, they varied from .83 to .96, showing a similarity of distribution. Frequency in the occurrence of categories among phases and the whole material was checked by the z-test. The only category clearly distinguished in the different phases was disturbed activity (No. 7). Statistically, its frequency of occurrence grew in a highly significant manner towards the end of the lesson.

Also noticeable was a contrast between the first and last phase. In the first (division of work and familiarization with task), categories 2, 3, 4 and 6 occurred with a frequency above the average and category 7 with a frequency below the average. In the last or finishing phase the situation was opposite. In the middle or actual working phase the occurrence of categories was evenly distributed. Only in a few cases, however, were differences statistically significant.

3.6. Performers of activities and targets

Pupils were arranged in order of precedence by groups in accordance with the extent to which group members directed activities toward each of their fellows. From performers of activities and targets percentage matrices were formed which also expressed for each member the number of activities directed to the group as a whole, to the task, to the teacher and to outsiders.

The number of activities addressed to the group as a whole was small, varying between 0 % and 4 % for individual pupils and 0 % and 3 % for groups. Low figures were the result of an observational method by which activities intended for the whole group or several members are generally unitized to the individual member.

Groups acted independently of the teacher, asking her advice or following her actions with regard to only 2-6 % of all activities. With individual pupils the figure varied from 2 % to 8 %.

The number of activities directed by pupils to each other varied with the seating. Statistically significant interaction occurred more between those seated opposite each other than those seated side by side or obliquely opposite. When checked by the z-test, discrepancies were significant at the level of 0.1 %. Discrepancies did not appear between pupils sitting side by side or obliquely opposite.

In actual problem-solution groups the member who accepted most activities had the highest load with the third or independent working factor. In opinion groups the first member had a high figure with the solidarity factor. Typical of those who received least attention in all groups was a low figure with the second or third or with both these factors.

4. Discussion

This investigation was a case study, which makes generalization difficult. Its aim was to map out a problem area and to evolve an observational method for non-verbal behaviour, not to test hypotheses.

The development of categories succeeded in terms of reliability and non-ambiguity. On the other hand, the low correlations of the starting matrix made factor analysis more difficult. The validity problem has not yet been dealt with.

The method is limited in use because pictorial material is necessary for the performance of observations, which is a lengthy process even then. To increase unitizing reliability there should be at least two observers. Reliability in classification, on the other hand, does not demand a lengthy training for coders.

The elements of Schaffensunterricht were clearly revealed in the study. The effect of a stimulating theme on a pupil's ability to act independently is considerable in the light of results. In the third grade of an elementary school pupils already seem capable of acting as creative individuals produced by independent activity. Although groups were not formed on a free basis, one of them may be considered to represent a creative group because each member of it had a high figure with the factor of independsnt working. Results show that the teacher made an important contribution by preparing tasks suitable in nature and degree of difficulty, so that pupils were able to act in accordance with the independent working type.

It was found possible to distinguish the working types corresponding to the work type and creative type of Elsa Köhler's activity typology, and, further, so to adjust her unorganized type as to form a passive and solidarity type.

Owing to the scarcity of group work lessons, however, it is impossible from these results to make generalizations, which would require the support of more extensive material.

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Appendix 1.

Varimax technique - two factors' solution

	1	2	h^2
1	-0.814	-0.290	0.748
2	0.012	0.746	0.556
3	-0.460	0.381	0.357
4	0.610	0.382	0.518
5	0.011	-0.448	0.201
6	0.620	-0.106	0.396
7	0.331	0.563	0.427
Eigen-value	1.740	1.461	3.201

Varimax technique - three factors' solution

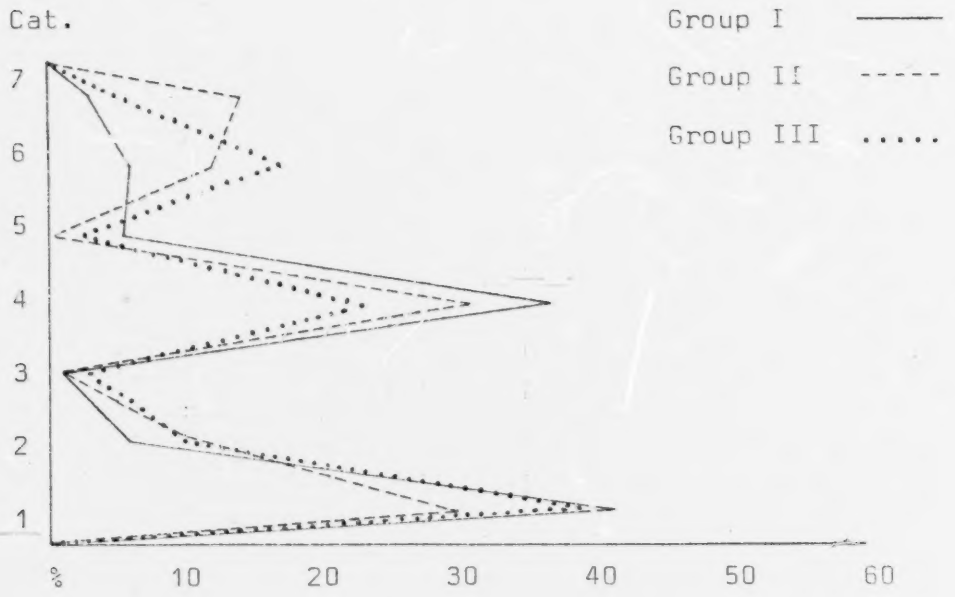
	1	2	3	h^2
1	-0.652	-0.137	0.550	0.747
2	0.303	0.686	0.116	0.575
3	-0.348	0.487	0.195	0.396
4	0.816	0.172	-0.106	0.706
5	-0.062	-0.450	0.032	0.207
6	0.130	-0.121	-0.727	0.552
7	0.136	0.564	-0.474	0.561
Eigen-value	1.343	1.291	1.119	3.753

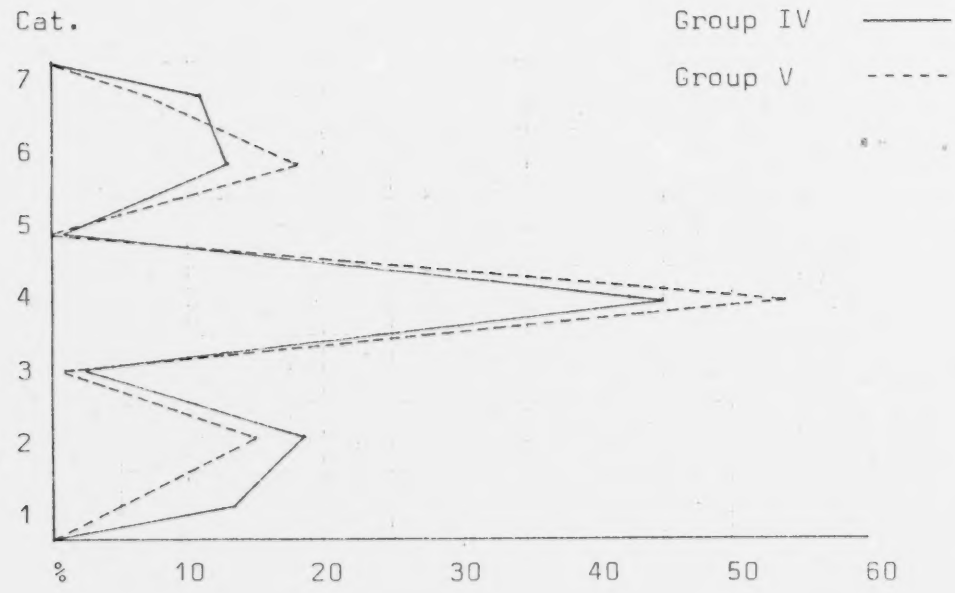
Varimax technique - four factors' solution

	1	2	3	4	h^2
1	-0.648	0.089	0.569	-0.060	0.755
2	0.443	0.509	0.047	0.353	0.582
3	-0.201	0.597	0.132	0.127	0.430
4	0.815	-0.097	-0.123	0.134	0.706
5	-0.079	-0.123	0.025	-0.559	0.335
6	0.073	-0.219	-0.710	-0.040	0.559
7	0.219	0.338	-0.516	0.365	0.561
Eigen-value	1.379	0.810	1.180	0.610	3.929

Appendix 2.

Percentage Profiles of the Groups





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